



ELEN1002: Concepts of Design

Course Coordinator: Ms. Yu-Chieh (Jessie) Liu

Project 1 ***Hoverboard Design***

1. Introduction

The aim of this project is to provide the student with an introduction to engineering design, by using imagination and a practical understanding of existing technology. There is a large research component to this project which will require the sourcing of information on cutting-edge technology. This project is also intended to develop an understanding of technical datasheets of modular components and the ability to combine high-level concepts and ideas into a plausible solution. This topic is dependent on the student obtaining knowledge of fundamental physics and equilibrium.

2. Project Task

Produce a paper design of your own depiction of a theoretically functional hoverboard. You will need to make reference to existing high-level components to combine into a final pre-prototype product design. Appropriate information from each component should be extracted from datasheets; factors such as (but not limited to) the dimensions, weight and operating voltages and power should be taken into consideration as part of the design.

Write a technical report on your hoverboard design with a maximum page limit of 6 pages, including calculations that support your design specification. Appended to your report must include technical drawings of your prototype (not included in page limit). You are also required to deliver an oral presentation on the design of the hoverboard.

2.1. Project Specifications

The hoverboard design is required to produce enough upward thrust that can carry a passenger load of 80 kg and must be able to travel up to a speed of 30 km/h while bearing its maximum weight. Consider the power storage and the distance that it will be able to travel using the onboard power source. You must also design the mechanism for the following ranges of movement: forward, left, right and stop. Assume that there is unlimited funding on this project, however, an estimated cost of building a prototype should be provided.

Note that this is a design with hypothetical constraints. Remember that engineering design is an iterative process. If the final design does not manage to meet the design specification for this project, provide an analysis of the why your design does not meet the requirements. If specifications are met, provide additional ideas for improvement.

3. Project Deliverables

As part of the investigation, you are required to produce a 6-page technical report and technical drawings and an oral presentation.

3.1. Technical Report

The technical report must include the following:

- **Cover page:** Course code, project title, student name, student number, mentor name, group number, and date of submission.
- **Abstract:** Either on cover page OR on *page i* as shown in Blue book.
- **6-page limit includes:** Introduction, Body sections, Conclusion and References.
- **Main report:** Practical details on the background research, investigation, design details, results, discussions and conclusions.
- **Appendix A:** Technical drawing including a top, front and side view. Isometric view is optional.

3.2. Oral Presentation

You are required to deliver an oral presentation on the contents of your report. You have a maximum of 10 minutes to present your design. Assume that you are bidding for unlimited funding to the board of directors of a company that is interested in funding a prototype. Oral presentations will be conducted in the following sessions:

- Wednesday 3 April 2013 (08h00-10h00)
- Thursday 4 April 2013 (10h00-11h00)

Note that the final copy of the presentation must be submitted with all other project components by the deadline provided in Section 4. Late submission penalties will apply.

4. Submission Details

The submission deadline for all written components of the project is at **07h50 on Tuesday 2 April 2013**. Early printed report submissions must be handed in and signed off at EIE reception. Late submissions will be penalised according to guidelines specified in the “*Red Book*”. You are required to submit the following project components by the given deadline:

1. Printed report (stapled or bound) in the Red Submissions Box at EIE reception.
2. Electronic-copy of report (only applicable in Sakai, under the correct submission link).
3. Oral presentation (only applicable in Sakai, under the correct submission link).

File names should be labelled as follows:

[studentnumber]-Project1.[extension]

5. Assessment Criteria

Refer to the Course Brief and Outline for the project assessment weighting for this course. Table 1 provides a general breakdown for the assessed outcomes of the project.

Table 1: The assessment grid, checklist and mark breakdown for the expected outcomes of Project 1.

Outcomes	Checklist	Project 1
Technical communication skills (written, graphics)	<ul style="list-style-type: none"> – Technical writing style. – Appropriate formatting and logical flow. – Appropriate graphics and presentation of data/information. – Presence of appropriate abstract, introduction, conclusion. – Good referencing practises. 	20%
Engineering creativity and imagination	<ul style="list-style-type: none"> – Shows creativity in knowledge and solutions given realistic constraints. – Imaginative ideas are presented and critically analysed. 	20%
Technical content	<ul style="list-style-type: none"> – Appropriate use of mathematic formulas and relevant scientific concepts. – Accuracy of solution given appropriate engineering assumptions. – Evidence of logical and systematic problem solving processes. 	20%
Professional, ethical, economic, environmental & social awareness	<ul style="list-style-type: none"> – Displays knowledge and consideration to each of the outcome points in the scope of the project. – Awareness of the tradeoffs in the solution. – Understanding the role of an engineer in society. 	20%
Supporting technical deliverables: 1. Technical drawing 2. Oral presentation	<ul style="list-style-type: none"> – Components 1 and 2 are equally weighted. – Component 1: Neatness and accuracy to report description of finished product. Follows correct professional conventions. – Component 2: Presentation ability (voice projection and verbal ability), professionalism, slide content and use of appropriate visual aids. 	20%
Overall mark for Project 1:	/100%
Notes <ul style="list-style-type: none"> • Each outcome is assigned a score (entered in the shaded cells) on a scale from 1 to 5 where: <ul style="list-style-type: none"> ○ 5 is excellent, ○ 4 is good, ○ 3 is acceptable, ○ 2 is poor and ○ 1 is unacceptable 		